The Macroeconomic Determinants of Stock Market Development: Evidence from South Africa

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Abstract

This study examines the macroeconomic determinants of stock market development in South Africa during the period 1975-2015. Specifically, it examines the impact of banking sector development, economic growth, inflation rate, real interest rate, and trade openness on the development of South African stock market. Currently, while theoretical and empirical literature presents diverse views on the relationship between each determinant and stock market development, no studies have been conducted with particular reference to the South African stock market. Given the significant role the South African stock market plays in the world, especially in Africa as measured by its market capitalization and market capitalization ratio, there is a need for more understanding of the macroeconomic determinants' impact on its development. This paper enriches existing literature by investigating the macroeconomic determinants of stock market development in South Africa using the ARDL bounds testing procedure. The results find that banking sector development and economic growth have positive long-run impact, whereas inflation rate and trade openness have negative long-run impact on stock market development. In the short run, the results find that economic growth have positive impact, while inflation rate, real interest rate, and current period of trade openness have negative impact on stock market development. These findings have important policy implications.

JEL Codes: *C22; E44; G23*
Keywords: *Macroeconomic determinants; Stock market development; South Africa; ARDL bounds testing*

1. Introduction

Existing theoretical literature has shown the role of stock market in fostering economic growth. It demonstrates how stock market can provide market liquidity, reduce the cost of mobilising savings, improve corporate governance, and promote international risk-sharing, thereby promoting economic growth (see Jensen and Murphy 1990, Levine 1991, Obstfeld 1994, Bencivenga et al. 1996, Greenwood and Smith 1997). Given the numerous benefits of stock

market development, there is an increasing number of studies trying to identify key determinants behind stock market development by constructing models to identify the factors affecting development of stock market. In summary, the micro-based asset pricing models find that there are two broad categories of factors that will affect stock prices. They are the macroeconomic factors and portfolio characteristic factors (see Sharpe 1964, Fama 1965, Lintner 1965, Malkiel and Fama 1970, Merton 1973, Ross 1976, Breeden 1979, Stulz 1981a, b, Cochrane 1991). In addition to the asset pricing models, the macro-based Calderon-Rossell (1990, 1991) model has identified economic growth and stock market liquidity as the determinants of stock market development.

Apart from the micro-based and macro-based models, there is a huge volume of literature linking stock market development to macroeconomic and institutional factors. Among the macroeconomic factors identified as influencing stock market development by the literature are economic development, banking sector development, inflation rate, exchange rate, private capital flows, and trade openness (see Dornbusch and Fisher 1980, Jorion 1991, Boyd et al. 1996, 2001, Greenwood and Smith 1997, Levine 1997, 2005, Jeffus 2004, Niroomand et al. 2014, among others). Similarly, institutional factors such as the legal origin, legal protection on investors, corporate governance, financial market liberalization, stock market integration, have been identified by the literature as the crucial factors influencing stock market development (see Pagano 1993a, b, La Porta et al. 1997, 1998, 2000, Shleifer and Vishny, 1997, Levine and Zervos 1998a, Bekaert and Harvey 2000, Henry 2000a, b, Mishkin 2001, Svaleryd and Vlachos 2002).

While theories analysing institutional factors have reached general consensus on how these factors influencing stock market development, theories on macroeconomic determinants are far from conclusive. Against this highly debatable theoretical background, there are studies attempting to empirically investigate the determinants of stock market development (see for example, Garcia and Liu 1999, El-Wassal 2005, Ben Naceur et al. 2007; Billmeier and Massa 2009, Yartey 2007, 2010). However, the existing studies that investigate this question employ panel data analysis, under which country-specific information may be lost due to the lumping of countries (see Hsiao 2005). To resolve this problem, time-series techniques may be very useful. In addition, most of the existing studies solely focus on the long-run relationships between the

stock market development and its determinants, with little attention paid on the short-run relationships between them. To enrich the existing literature, we aim to empirically investigate the short and long-run relationships between the stock market development and its determinants in the context of South Africa.

South Africa had the largest stock market in Africa in terms of stock market capitalization in 2015, which was 13 times larger than the second one in Egypt and 14 times larger than the one in Nigeria (WDI 2017). In term of international ranking, the stock market in South Africa was ranked 25th largest in the world in 2015 (WDI 2017). The performance of South African stock market was even more impressive when measured by stock market capitalization to GDP. It was ranked as the second largest in the world in 2015, just behind the one in Hong Kong (WDI 2017). Despite the importance of South African stock market in Africa and also on the global stage, there is no similar study investigating the determinants of stock market development in the country. Therefore, in this paper, we aim at identifying the factors affecting the stock market development of South Africa during the period 1975-2015.

The rest of the paper is organised as follows. Section 2 provides an overview of the theoretical and empirical underpinning of the determinants of stock market development. Section 3 outlines the empirical methodology. Section 4 presents the empirical results. Section 5 concludes the paper.

2. Literature Review

Due to the importance of stock market in promoting economic growth, there is an increasing number of studies examining the factors leading to the development of stock market. These factors can be broadly classified as micro-based theories and macro-based theories. In the micro-based theories, there are a number of asset pricing theories trying to determine the fundamental value of an asset, including stock. The fundamental value of stock, which then affects its market price, is crucial to the development of stock market. Under these micro-based asset pricing models[1], they demonstrate that there are two types of factors which can affect the fundamental

[1] The asset pricing theories include: Efficient Market Hypothesis (Fama 1965), Capital Asset Pricing Model (CAPM) (Sharpe 1964, Lintner 1965), Arbitrage Pricing Theory (Ross 1976), Intertermporal CAPM (Merton 1973),

value of the stock. The first type is macroeconomic factors such as the foreign exchange rate, interest rate, stock market volatility (or market risk), stock market liquidity, economic growth, industrial production, and factors affecting current and future consumption (see Sharpe 1964, Lintner 1965, Merton 1973, Breeden 1979, Stulz 1981a, b, Cochrane 1991). And the second type is portfolio characteristic factors, which include the rate of stock return, the variance of stock return, dividends or earnings, book to market ratios, and the company size (see Fama 1965, Malkiel and Fama, 1970, Ross 1976). In addition to the micro-based theories, there are macro-based studies attempting to investigate the factors affecting the stock market development. For example, the Calderon-Rossell (1990, 1991) have identified that stock market liquidity and economic growth are the determinants of stock market development.

Apart from the micro and macro-based models, there are many studies linking stock market development to macroeconomic and institutional factors. The macroeconomic factors include the economic development, banking sector development, inflation rate, exchange rate, foreign direct investment, and trade openness (see Dornbusch and Fisher 1980, Jorion 1991, Boyd et al. 1996, 2001, Greenwood and Smith 1997, Levine 1997, 2005, Jeffus 2004, Niroomand et al. 2014, among others). The institutional factors are the legal origin, legal protection on investors, corporate governance, financial market liberalisation, and stock market integration. In terms of the relationship between the economic development and stock market development, theoretical literature suggests that real income level and real income growth have positive impact on the development of stock market. These models demonstrate that the formation of financial market, including the stock market, incurs a significant amount of fixed cost. When the economy develops, the relative importance of this fixed cost reduces, thereby increasing participants in the stock market (see Greenwood and Jovanovic 1990, Greenwood and Smith 1997, Boyd and Smith 1998). When we consider the relationship between the development of banking sector and stock market, studies show inconclusive results. Some studies argue that banking sector and stock market are substitutes while other suggests they are complements. In terms of substitutability, various studies show that banking sector performs better than the stock market in providing financial functions to the economy (see DeAngelo and Rice 1983, Stiglitz 1985, Bhide 1993).

Consumption-based CAPM (Breeden 1979), International CAPM (Stulz 1981a, b), and Producation-based Asset Pricing Model (Cochrane 1991).

However, other studies argue that the focus should be on the importance of the overall financial market rather than the relative importance of banking sector against the stock market (see Merton and Bodie 1995, 2004, Levine 1997). Furthermore, Levine (2005) argues that banking sector and stock market are complementary in providing financial services to the investors.

Regarding inflation rate, theoretical studies argue that higher inflation rates are associated with less liquid and smaller stock market. In addition, they demonstrate that there exists a non-linear relationship between the inflation rate and financial market development, including stock market development (see Azariadas and Smith 1996, Choi et al. 1996, Huybens and Smith 1998, 1999, Boyd et al. 2001). In terms of the exchange rate, economic theories demonstrate a strong association between exchange rate behaviour and stock market performance. They argue that currency appreciation (or depreciation) can have a negative (or positive) impact on stock prices (see Dornbusch and Fisher 1980, Jorion 1991). On the other hand, Gavin (1989) indicates the relationship between exchange rate and stock prices can be positive or negative under different circumstances. On the relationship between the foreign direct investment (FDI) and the stock market development, existing theoretical studies present opposing views. Some studies argue that FDI is a just a substitute for domestic stock market development whereas others show FDI promotes the development of stock markets (see Hausmann and Fernández-Arias 2000a, b, Claessens et al. 2001). Regarding trade openness, literature suggests it benefits stock market development in two different ways (Niroomand et al. 2014). First, trade openness is beneficial to the stock market development through the improvement of the supply side of the stock market (see Rajan and Zingales 2003, Braun and Raddatz 2005). Second, trade openness fosters stock market development by increasing the demand on financial products and services (see Newbery and Stiglitz 1984, Svaleryd and Vlachos 2002, Vazakidis and Adamopoulos 2009).

Alongside these macroeconomic factors, institutional factors also play an influential role in the development of stock market. The factors investigated by the existing literature include legal origin, legal protection on investors, corporate governance, financial market liberalization, and stock market integration. Overall, theories explain how favourable institutional factors, such as common law systems, better legal protection of the interests of shareholders and creditors, effective corporate governance system, more liberalized financial market, and more integrated

stock market can foster the stock market development (see Pagano 1993a, b, La Porta et al. 1997, 1998, 2000, Shleifer and Vishny 1997, Levine and Zervos 1998a, Bekaert and Harvey 2000, Henry 2000a, b, Mishkin 2001, Svaleryd and Vlachos 2002).

The theoretical literature discussed above shows that the results are largely inconclusive regarding the significance and impact of the determinants on stock market development. As such, there are a number of empirically studies emerged to investigate the determinants of stock market development. In this paper, we classify the empirical studies into three broad categories based on the level of income of the study country[2]. They are: (i) studies on the developing countries, (ii) studies on the developed countries, and (iii) studies on the mixture of both countries. Table 1 shows a summary of empirical studies on the determinants of stock market development. Overall, the existing studies find that some macroeconomic determinants such as financial intermediary development, real income level, domestic investment, saving rate, private capital flows, and foreign portfolio investment, have significant positive effects on stock market development. In addition, some studies found that macroeconomic instability can adversely affect the development of stock market. Apart from the macroeconomic factors, the empirical studies also found that institutional factors, such as institutional quality, financial liberalisation policies, political risk, law and order, and bureaucratic quality are favourable determinants that foster stock market development.

Table 1: Summary of empirical studies on the determinants of stock market development

Author(s)	**Region/ Country**	**Method(s)**	**Conclusions**
Developing Countries			
Levine and Zervos (1998a)	16 emerging markets	Qualitative analysis; Time series analysis	Positive relationship between capital control liberalization and stock market development. Positive relationship between regulatory institutional indicators and stock market development.
Henry (2000a)	12 emerging countries	Qualitative analysis; Panel data analysis	Positive relationship between stock market liberalization and stock market development.
Pistor et al.	24 transition	Qualitative analysis;	Positive relationship between the effectiveness of

[2] We classify countries using the World Bank's (2016) classification of countries. The developed countries are those in the high-income group, with 2015 gross national income (GNI) per capita of US$12 476 or more. The developing countries are those within the low to upper middle-income groups, with 2015 GNI per capita of US$12 475 or less.

(2000)	economies	Cross-sectional regression	legal institutions and market capitalization.
Kutan and Aksoy (2003)	Turkey	Asymmetric GARCH model	No association between inflation and stock returns.
El-Wassal (2005)	40 emerging economies	Fixed effects panel data analysis	Economic growth, financial liberalisation policies, and foreign portfolio investment have positive impact on stock market development.
Adjasi and Biekpe (2006)	14 African countries	Dynamic panel data analysis	Positive relationship between economic growth and stock market development.
Ben Naceur et al. (2007)	12 Middle Eastern and North African region countries	Fixed and random effects of panel data analysis	Financial intermediary development, saving rate, and stock market liquidity have positive impact, while macroeconomic instability has negative impact on stock market development.
Buchanan and English (2007)	24 emerging market	Qualitative analysis	Legal foundation affects stocks returns distribution and stock market size.
Yartey (2007)	13 African countries	Fixed and random effects of panel data analysis	Banking sector development, domestic savings and investment, income level, stock market liquidity, and institutional quality have positive impact on stock market development.
Kim and Wu (2008)	51 emerging markets	Panel data estimation	Sovereign credit rating measure has significant effect on stock market development.
Akinlo and Akinlo (2009)	7 sub-Sahara African countries	ARDL bounds test	Positive relationship between economic growth and stock market development.
Billmeier and Massa (2009)	17 emerging markets	Fixed and random effects of panel data analysis	Institutions and remittance have positive impact on stock market development.
Rhee and Wang (2009)	Indonesia	Granger causality test	Negative relationship between foreign ownership and stock market liquidity.
Agbloyor et al. (2013)	16 African countries	Two Stage Least Square	Positive relationship between FDI and stock market development.
Malik and Amjad (2013)	Pakistan	Granger causality test	Positive relationship between FDI and stock market development.
Developed Countries			
Arestis and Demetriades (1997)	Germany, South Korea and the US	Johansen cointegration analysis	Bidirectional causality between economic growth and stock market development in the US.
Hondroyiannis et	Greece	Time-series	Bidirectional causality between economic growth

al. (2005)		regression	and stock market development.
Athanasios and Antonios (2012)	Greece	Time-series regression	Causal flow from economic growth to stock market development.
Cheng (2012)	Taiwan	Time-series VAR model	Bidirectional causality between economic growth and stock market development.
Marques et al. (2013)	Portugal	Time-series VAR model	Bidirectional causality between economic growth and stock market development.
Developed and Developing Countries			
Atje and Jovanovic (1993)	40 countries	Cross-country regression	Positive relationship between economic growth and stock market development.
Boyd et al. (1996)	51 countries	Cross-sectional regression	Negative and non-linear relationship between inflation and stock market development. Negative relationship between inflation and real equity return.
Levine and Zervos (1996)	41 countries	Pooled, cross-country regressions	Positive relationship between economic growth and stock market development.
La Porta et al. (1997)	49 countries	Qualitative study; Cross sectional regression	Negative relationship between investor protection and stock market development.
La Porta et al. (1998)	49 countries	Qualitative study; Cross-sectional regressions	Legal traditions affect degree of protection on creditors and shareholders, and efficiency of contract enforcement, thereby affecting stock market.
Levine and Zervos (1998b)	47 countries	Cross-country regressions	Positive relationship between economic growth and stock market development.
Barnes et al. (1999)	25 countries	Time-series regressions	Negative relationship between inflation and equity returns in low inflation countries. Positive relationship between inflation and equity returns in high inflation countries.
Garcia and Liu (1999)	15 countries	Fixed effects of panel data analysis	Banking sector development, real income level, saving rate, and stock market liquidity have positive impact on stock market capitalization.
Boyd et al. (2001)	48 countries	Cross-sectional regressions; Generalized Method of Moments	Negative and non-linear relationship between inflation and stock market development. Positive and non-linear relationship between inflation and nominal stock returns.
Perotti and van Oijen (2001)	31 countries	Pooled country regression	Positive relationship between privatization and stock market development.
Minier (2003)	47 countries	Regression tree techniques	Positive relationship between economic growth and stock market development in countries with high

			levels of market capitalization.
Jeffus (2004)	Argentina, Brazil, Chile and Mexico	Multivariate regressions	Positive relationship between FDI and stock market development.
Boubarkri and Hamza (2007)	61 countries	Two Stage Least Square	Privatization is an important determinant of stock market.
Yartey (2010)	42 emerging economies	Generalized Method of Moments	Macroeconomic factors (i.e. income level, gross domestic investment, banking sector development, private capital flows and stock market liquidity), and institutional factors have positive impact on stock market development.

3. Methodology

To examine the long-run relationships between the development of stock market and its sets of macroeconomic determinants, we use the autoregressive distributed lag (ARDL) bounds testing procedure suggested by Pesaran et al. (2001). This procedure is preferred to other procedures because it does not impose the restrictive assumption that all the variables in the model must be integrated of the same order. In addition, while other cointegration tests are sensitive to the sample size, the ARDL bounds test does well even when the sample size is small. In this study, the ARDL bounds testing procedure employs the following equation:

$$\begin{aligned}\Delta lnMCR_t = \gamma_0 &+ \sum_{i=1}^{n} \gamma_{1i}\, \Delta lnMCR_{t-i} + \sum_{i=0}^{n} \gamma_{2i}\, \Delta lnBNK_{t-i} + \sum_{i=0}^{n} \gamma_{3i}\, \Delta lnGDP_{t-i} + \sum_{i=0}^{n} \gamma_{4i}\, \Delta lnINF_{t-i} \\ &+ \sum_{i=0}^{n} \gamma_{5i}\, \Delta RINT_{t-i} + \sum_{i=0}^{n} \gamma_{6i}\, \Delta lnTRADE_{t-i} + \delta_1 lnMCR_{t-1} + \delta_2 lnBNK_{t-1} \\ &+ \delta_3 lnGDP_{t-1} + \delta_4 lnINF_{t-1} + \delta_5 RINT_{t-1} + \delta_6 lnTRADE_{t-1} \\ &+ \varepsilon_t \end{aligned} \quad (1)$$

where ε, γ, and δ are the white-noise error term, the short-run coefficients, and the long-run coefficients of the model respectively; and Δ is the first difference operator. *t* denotes time period; *n* is the maximum number of lags in the model. The variables, namely: $lnMCR$, $lnBNK$, $lnGDP$, $lnINF$, $RINT$, and $lnTRADE$ are the natural logarithm of the market capitalization ratio, domestic credit to GDP, real GDP per capita, inflation rate, real interest rate, and trade openness,

respectively. In this study, the maximum number of lags in the model is chosen based on the Schwarz Criterion (SC).

The reliability of the estimates of Eq. (1) depends on the joint significance of the coefficients δ_1, δ_2, δ_3, δ_4, δ_5 and δ_6. In other words, the variables in Eq. (1) should be cointegrated in order to ensure that the coefficients are efficiently estimated. We can verify the existence of cointegration by testing the null hypothesis of no cointegration relationship:

$$H_0 : \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = 0$$

Pesaran et al. (2001) have constructed two sets of critical values. The first set of critical values are calculated by assuming that the variables in Eq. (1) are integrated of order zero, I(0), while the second set of critical values are calculated by assuming that they are integrated of order one, I(1). We do not reject the null hypothesis of no cointegration when the *F*-statistic falls below first set of critical values. Similarly, we reject the null hypothesis of no cointegration when the calculated *F*-statistic is greater than the second set of critical values. However, when the *F*-statistic falls between both sets of critical values, the test is inconclusive.

If the variables are found to be cointegrated, we then proceed to estimate the short-run relationships of the variables using an error correction model in the following form:

$$\begin{aligned}\Delta lnMCR_t = \gamma_0 &+ \sum_{i=1}^{n} \gamma_{1i}\, \Delta lnMCR_{t-i} + \sum_{i=0}^{n} \gamma_{2i}\, \Delta lnBNK_{t-i} + \sum_{i=0}^{n} \gamma_{3i}\, \Delta lnGDP_{t-i} + \sum_{i=0}^{n} \gamma_{4i}\, \Delta lnINT_{t-i} \\ &+ \sum_{i=0}^{n} \gamma_{5i}\, \Delta RINT_{t-i} + \sum_{i=0}^{n} \gamma_{6i}\, \Delta lnTRADE_{t-i} + \delta ECM_{t-1} \\ &+ \varepsilon_t \end{aligned} \quad (2)$$

where δ is the coefficient of the error-correction term, ECM_{t-1}. δ is expected to have a negative sign. It implies that the variable can quickly adjust back to their equilibrium levels if they deviate from their equilibrium levels in the short run.

4. Empirical Results

4.1 Data and variable identification

We use annual time-series data which covers the period of 1975-2015. The period covered is solely based on data availability, and the data have been obtained from the World Development Indicators (WDI 2017) compiled by the World Bank. To access the macroeconomic determinants of stock market development, we need the measure of stock market development and measures of various macroeconomic variables. In terms of stock market development, we use the market capitalization ratio (*MCR*) to measure the development of stock market. It is defined as the value of listed domestic shares on the domestic exchange divided by GDP. This indicator has been used in other studies (see Garcia and Liu 1999, Boyd et al. 2001, El-Wassal 2005, Ben Naceur et al. 2007, Yartey 2007, 2010).

In this paper, the macroeconomic determinants on stock market development include banking sector development (BNK), economic growth (GDP), inflation rate (INF), real interest rate (RINT)) and trade openness (TRADE). To measure banking sector development, we use the domestic credit to GDP which captures the private credit made by deposit money banks and other financial institutions to GDP. This proxy has been used in other empirical studies such as Levine et al. (2000), Boyd et al. (2001), Beck et al. (2007), Sehrawat and Giri (2016). To measure economic growth, we use GDP per capita (constant 2010 US$), so that changes in it reflect the rate of economic growth. The proxy is defined as the real GDP divided by midyear population, and the real GDP is an inflation adjusted measure that captures the value of all goods and services produced in a given year expressed in the base year prices. This proxy has been used in other empirical studies (see Arestis and Demetriades 1997, Shan et al. 2001, Temple and Wöβmann 2006, Hartwig 2012). The inflation rate is measured by the annual percentage change of consumer price index. It reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at yearly intervals. This proxy has been used in other studies such as Shan et al. (2001), Boyd et al. (2001), Marques et al. (2013), among others. And the real interest rate is proxied by the lending interest rate adjusted for inflation as measured by the GDP deflator. Lastly, we use the sum of exports and imports of goods and services as a share of GDP to measure trade openness. Studies

using this proxy to measure trade openness include Rajan and Zingales (2003) and Niroomand et al. (2014), among others. Table 2 reports the descriptive statistics of the variables.

Table 2: Descriptive statistics of the variables

	lnMCR	***lnBNK***	***lnGDP***	***lnINF***	***RINT***	***lnTRADE***
Mean	4.928	4.074	8.800	2.150	3.602	3.968
Median	5.009	4.042	8.789	2.215	3.910	3.976
Maximum	5.623	4.403	8.937	2.926	12.993	4.289
Minimum	4.017	3.756	8.672	0.326	-12.340	3.654
Std. Dev.	0.466	0.169	0.083	0.537	4.458	0.152
Skewness	-0.316	0.161	0.240	-0.988	-0.802	-0.349
Kurtosis	2.092	1.969	1.876	4.334	5.802	2.572
Jarque-Bera	2.089	1.994	2.552	9.708	17.810	1.144
Probability	0.352	0.369	0.279	0.008	0.000	0.564
Sum	202.040	167.015	360.783	88.134	147.693	162.669
Sum Sq. Dev.	8.675	1.137	0.278	11.527	794.845	0.920
Observations	41	41	41	41	41	41

Notes: Std. Dev. and Sum Sq. Dev. denote, respectively, standard deviation and sum of squared deviations. *ln* denotes the natural log operator.

4.1 Results of Stationarity Tests

Before we investigate the relationship between stock market development and its sets of macroeconomic determinants, the stationary properties of the variables are examined. The variables include: *lnMCR, lnBNK, lnGDP, lnINF, RINT* and *lnTRADE*. To examine their stationary properties, we use two unit roots tests: the Dickey-Fuller Generalized Least Squares (DF-GLS) test, and the Ng-Perron test. Table 3 report the results of unit roots tests of the variables in levels and at the first differences. It shows that variables such as *lnINF* and *RINT* are stationary in levels while others such as *lnMCR, lnBNK, lnGDP and lnTRADE* are stationary at the first differences.

Table 3: Results of unit roots tests of the variables in levels and at the first differences

Dickey-Fuller Generalized Least Squares (DF-GLS) Test

Variable	Stationarity of all variables in levels				Stationarity of all variables at first differences			
	Without trend	Lag	With trend	Lag	Without trend	Lag	With trend	Lag
lnMCR	-1.118	0	-4.578***	0	-6.976***	0	-6.814***	1
lnBNK	-0.626	0	-3.484**	0	-6.575***	0	-6.203***	0
lnGDP	-1.060	1	-1.405	1	-3.944***	0	-4.126***	0
lnINF	-2.009**	0	-3.415**	0	NA	NA	NA	NA
RINT	-3.291***	0	-3.741**	0	NA	NA	NA	NA
lnTRADE	-1.582	0	-1.782	0	-5.697***	0	-5.877***	0

Ng-Perron Test

Variable	Stationarity of all variables in levels				Stationarity of all variables at first differences			
	Without trend	Lag	With trend	Lag	Without trend	Lag	With trend	Lag
lnMCR	-0.916	0	-2.993**	0	-3.087***	0	-4.369***	1
lnBNK	-0.545	0	-2.581	0	-2.784***	0	-2.978**	0
lnGDP	-1.162	1	-1.423	1	-2.833***	0	-2.876*	0
lnINF	-1.792*	0	-2.648*	0	NA	NA	NA	NA
RINT	-2.590***	0	-2.787*	0	NA	NA	NA	NA
lnTRADE	-1.488	0	-1.591	0	-3.110***	0	-3.110**	0

Notes: *, ** and *** denote significance at 10%, 5% and 1%, respectively. NA denotes non-applicable.

4.2 Empirical analysis using ARDL bounds testing procedure

Having found that the variables are integrated of order zero or one, we proceed to test the long-run relationships between the stock market development and its determinants using the ARDL bounds testing procedure. The calculated *F*-statistic is 5.731, which is higher than the critical value reported by Pesaran et al. (2001) in Table CI (iii) Case III. Therefore, the results show that the variables in the model are cointegrated. Table 4 reports the result of ARDL bounds testing for cointegration, and Table 5 the critical values of ARDL bounds test respectively. Having established that *lnMCR, lnBNK, lnGDP, lnINF, RINT,* and *lnTRADE* are cointegrated, we estimate the model using the ARDL bounds test approach. The first step is to determine the optimal lag length for the model using the Schwarz Criterion (SC). The optimal lag length selected based on SC is ARDL (1, 1, 1, 3, 0, 0). Table 6 reports the long and short-run results of the selected model.

Table 4: Bounds test *F*-test for cointegration

Dependent	Function	*F*-statistic	Cointegration

Variable			Status
MCR	F(MCR|BNK,GDP,INF, RINT, TRADE)	5.731***	Cointegrated

Note: *** denote significance level at 1%.

Table 5: The critical values of ARDL bounds test

Pesaran et al. (2001)		
Level of significance (%)	**Lower bound**	**Upper bound**
1	3.41	4.68
5	2.62	3.79
10	2.26	3.35

Table 6: The long-run and short-run results of the selected model

Long-run results
Dependent variable is *lnMCR*

Regressor	Co-efficient	Standard Error	T-ratio	Probability
lnBNK	1.254***	0.299	4.189	0.000
lnGDP	4.753***	0.840	5.660	0.000
lnINF	-0.465***	0.088	-5.272	0.000
RINT	-0.024	0.019	-1.262	0.218
lnTRADE	-3.788***	0.479	-7.902	0.000

Short-run results
Dependent variable is Δ*lnMCR*

Regressor	Co-efficient	Standard Error	T-ratio	Probability
Δ*lnBNK*	-0.226	0.358	-0.630	0.534
Δ*lnGDP*	2.351*	1.226	1.917	0.066
Δ*lnINF*	-0.153*	0.080	-1.909	0.067
Δ*lnRINT*	-0.015**	0.006	-2.516	0.018
Δ*lnTRADE*	-2.287***	0.389	-5.880	0.000
Δ*lnTRADE(-1)*	1.707***	0.333	5.126	0.000
Δ*lnTRADE(-2)*	1.534***	0.385	3.984	0.001
C	-18.129***	2.791	-6.496	0.000
ECM(-1)	-0.702***	0.108	-6.512	0.000

Notes: *, ** and *** denotes 10%, 5% and 1% significant levels respectively. Δ denotes first difference operator.

Overall, the long-run regression results show that banking sector development and economic growth have significant and positive impact on South African stock market development, whereas inflation rate and trade openness have significant and negative impact. Although the real

interest rate also shows a negative impact on stock market development, the coefficient is not significant.

On the economic growth, the results show that the coefficient of economic growth is positive and statistically significant. In the long run, a percentage increase in economic growth leads to approximately 4.75 per cent increase in stock market development. This finding is also supported by other studies (see Atje and Jovanovic 1993, Levine and Zervos 1998b, Adjasi and Biekpe 2006, Akinlo and Akinlo 2009). On the banking sector development, the results show that the coefficient of banking sector development is positive and statistically significant. In particular, a percentage increase in banking sector development leads to an increase in stock market development by 1.25 per cent in the long run. The finding of complementary nature between banking sector and stock market is in line with other studies (see Garcia and Liu 1999, Ben Naceur et al. 2007, Yartey 2007, 2010).

On the inflation rate, the results show that the coefficient of the inflation rate is negative and statistically significant. In the long run, a percentage increase in inflation rate leads to a decline of 0.47 per cent in stock market development. This finding is similar to other studies (see Boyd et al. 1996, 2001, Ben Naceur et al. 2007). On the trade openness, we find that the coefficient of the trade openness is negative and statistically significant. In the long run, a percentage increase in trade openness leads to a decline of 3.79 per cent in stock market development. The negative relationship is also found in other studies such as Jin (2006), Kim et al. (2011).

Similar to the long run results, the short-run regression results finds the economic growth to have had a positive impact on stock market development, whereas inflation rate, real interest rate, and current period of trade openness exerted a negative impact. In addition, the result shows that the coefficient of the error correction term is negative and statistically significant. It shows that when the variables drift apart from the equilibrium level by 1 per cent in the short run, it will adjust 0.70 per cent in a year.

Overall, the selected ARDL model fits well as indicated by the R-squared of approximately 71 percent. From the diagnostic tests reported in Table 7, the model is free from serial correlation,

heteroscedasticity, functional misspecification. Figure 1 and 2 shows the plot of cumulative sum of recursive residual (CUSUM) and cumulative sum of squares of recursive residual (CUSUMQ) of the model, respectively. It shows that the CUSUM fails the stability test. However, despite the CUSUM failing the stability test, the results can still be used for analysis (see Wong 2013).

Table 7: Results of diagnostic tests

Test	**Statistic**	***P*-value**
Serial Correlation: CHSQ(1)	0.300	0.584
Functional Form: F(1,25)	0.515	0.480
Normality: CHSQ (2)	6.779	0.034
Heteroscedasticity: CHSQ (1)	0.278	0.598

Figure 1: The plot of cumulative sum of recursive residuals

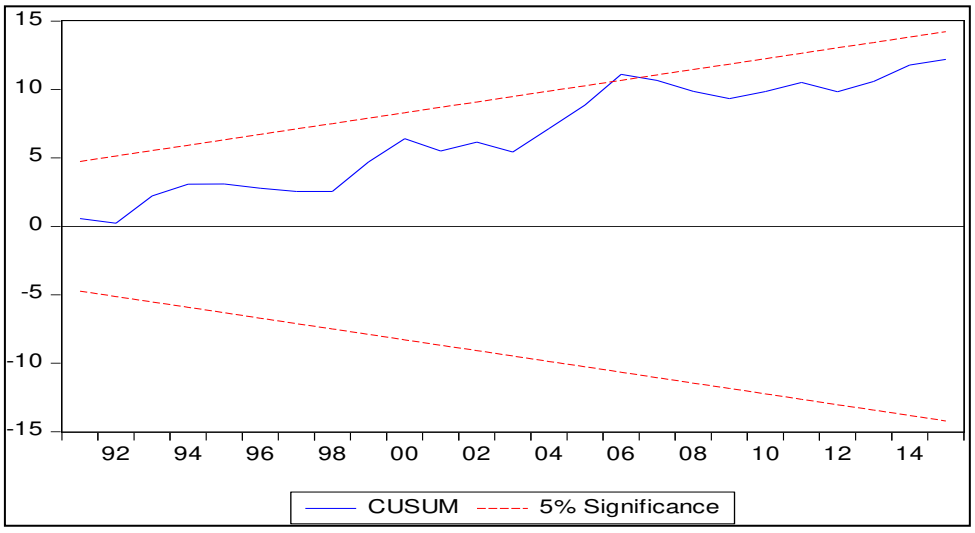
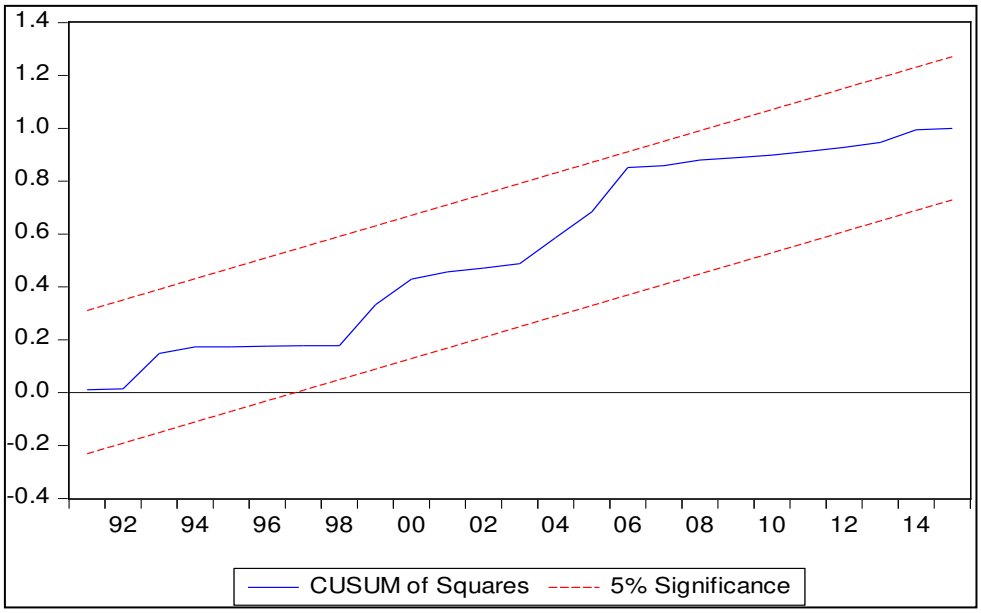


Figure 2: The plot of cumulative sum of squares of recursive residuals



5. Conclusion

This paper investigated the macroeconomic determinants of stock market development in South Africa. It attempted to identify the key macroeconomic drivers of the South African stock market in recent decades. The South African stock market has played a significant role in the global stage, especially in Africa. In 2015, it had the largest stock market in Africa in term of stock market capitalization, which was far ahead of it counterparts in the continent. In addition, the stock market in South Africa was ranked 25th largest in the world in 2015. The performance of South African stock market was even more phenomenal when measured by market capitalization ratio. It was ranked as the second largest in the world in 2015. Given the significance of the South African stock market and its remarkable growth, this paper investigated the macroeconomic determinants of stock market development in South Africa during the period of 1975 to 2015, using the ARDL bounds testing procedure.

We found that, in the long run, banking sector development and economic growth had a significant and positive impact, whereas inflation rate and trade openness had significant and negative impact on the South African stock market development. Although real interest rate also showed a negative impact on stock market development, the coefficient was not significant.

Similar to the long run results, short-run regression results finds that the economic growth had a positive short-run impact on South African stock market development, whereas inflation rate, real interest rate, and current period of trade openness exerted negative short-run impact. As informed by the empirical findings, policymakers of this country should consider pursuing policies that promote economic growth, foster banking sector development, and stabilize the inflation rate in order to promote long term development of the stock market. Despite trade openness being found to be negatively correlated with stock market development, we should interpret the finding with caution. The proxy we use to measure trade openness is defined as the sum of exports and imports of goods and services to GDP. To enhance stock market development, a country should aspire to improve the quality of both domestic goods and services. As a result, the amount of imports may fall. Therefore, this paper's findings regarding trade openness should not be interpreted as a support for any protectionist policies against international trade which will dampen the economic growth, thereby slowing down stock market development.

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